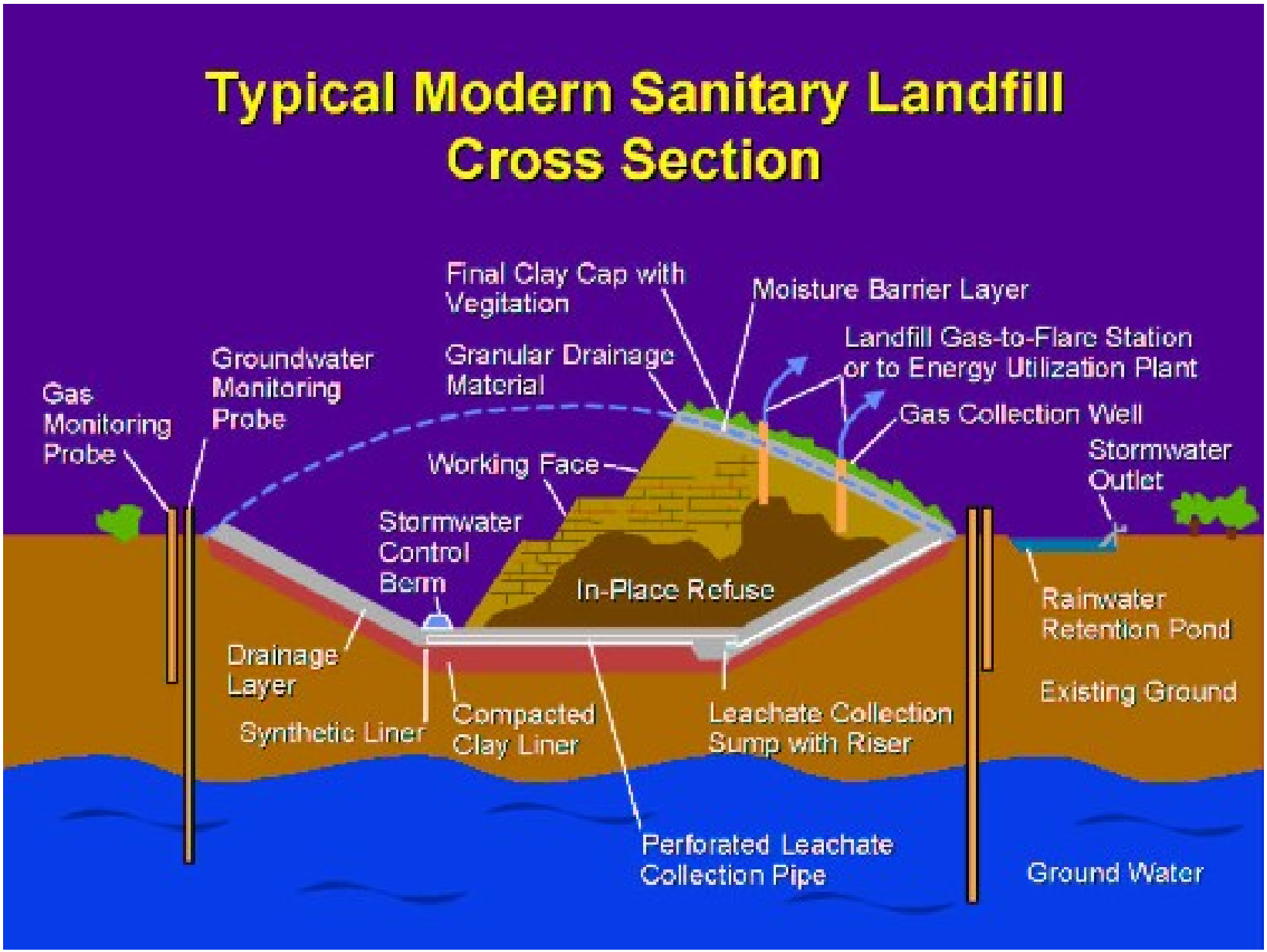
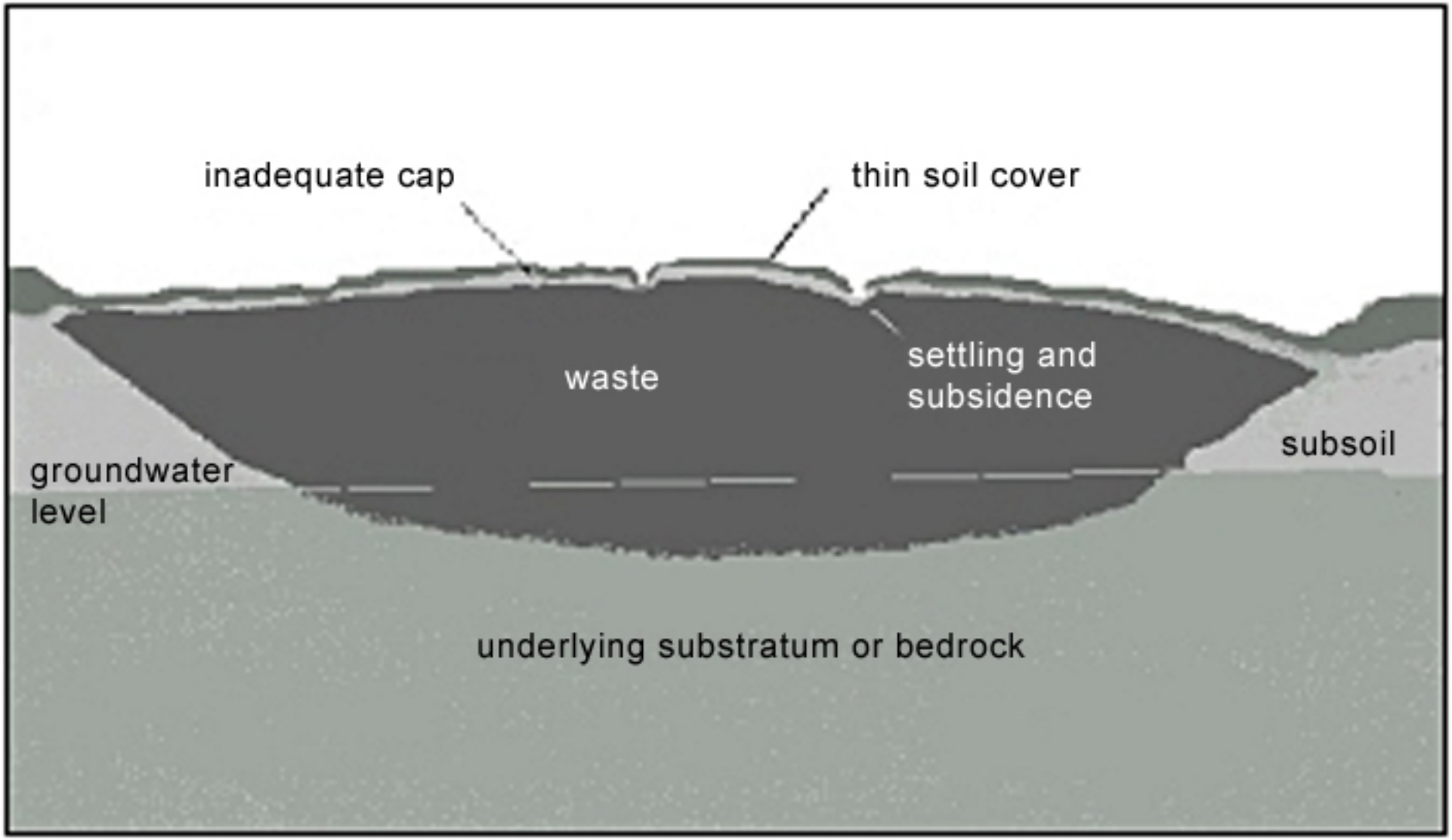
Landfill Leachate – An Environmental Concern

William F. Fifty and Kevin R. Russell

Surface Water and Wastewater Program

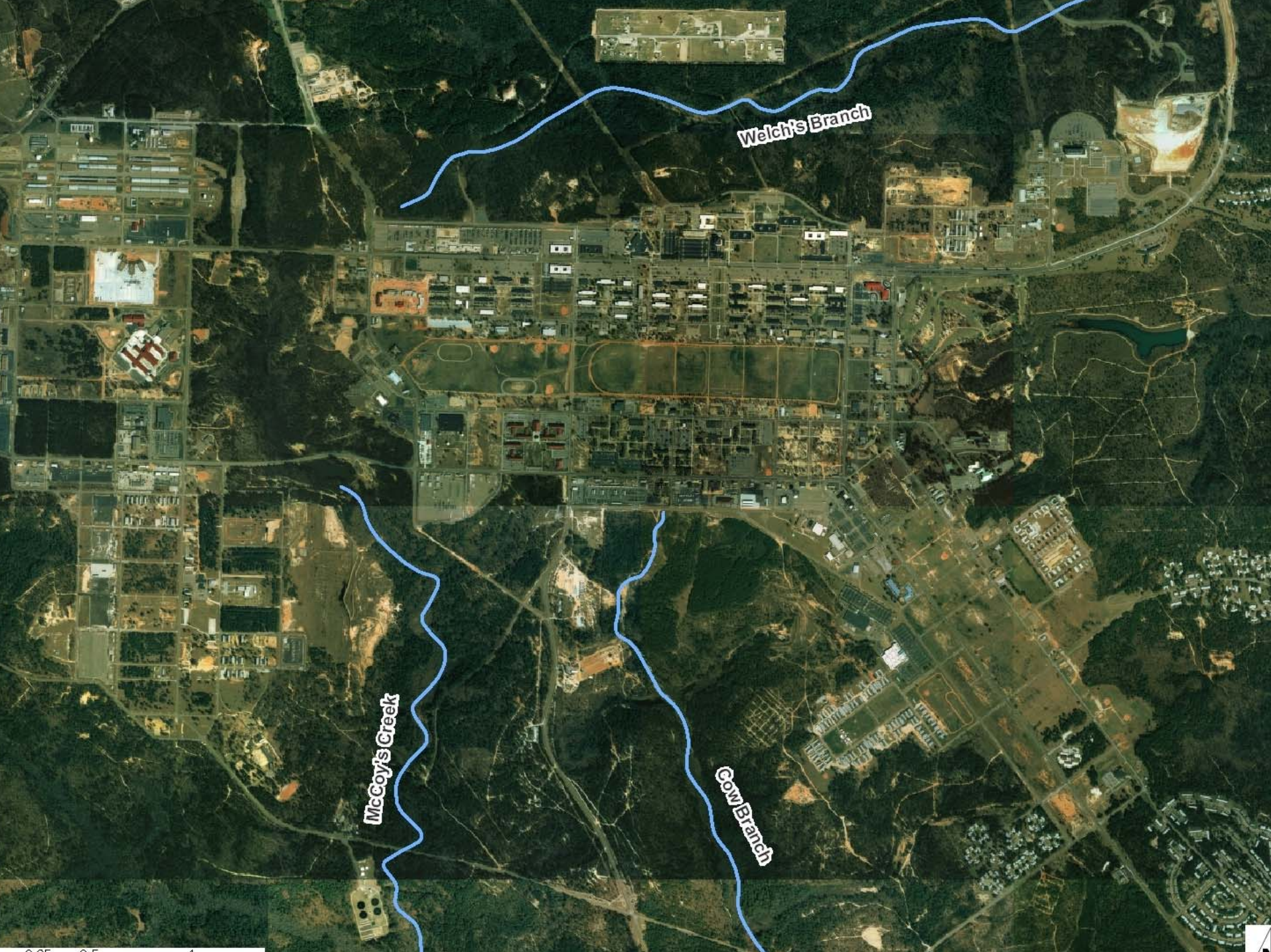
U.S. Army Center for Health Promotion and Preventive Medicine


Typical Modern Sanitary Landfill
Cross Section
Final Clay Cap with
Vegitation
Moisture Barrier Layer
Landfill Gas-to-Flare Station
or to Energy Utilization Plant
Groundwater
Monitoring
Probe
Granular Drainage
Material
Gas
Monitoring
Probe
Gas Collection Well
Stormwater
Outlet
Working Face
Stormwater
Control
Berm
In-Place Refuse
Rainwater
Retention Pond
Drainage
Layer
Existing Ground
Synthetic Liner
Compacted
Clay Liner
Leachate Collection
Sump with Riser
Perforated Leachate
Collection Pipe
Ground Water


inadequate cap
thin soil cover
waste
settling and
subsidence
subsoil
groundwater
level
underlying substratum or bedrock

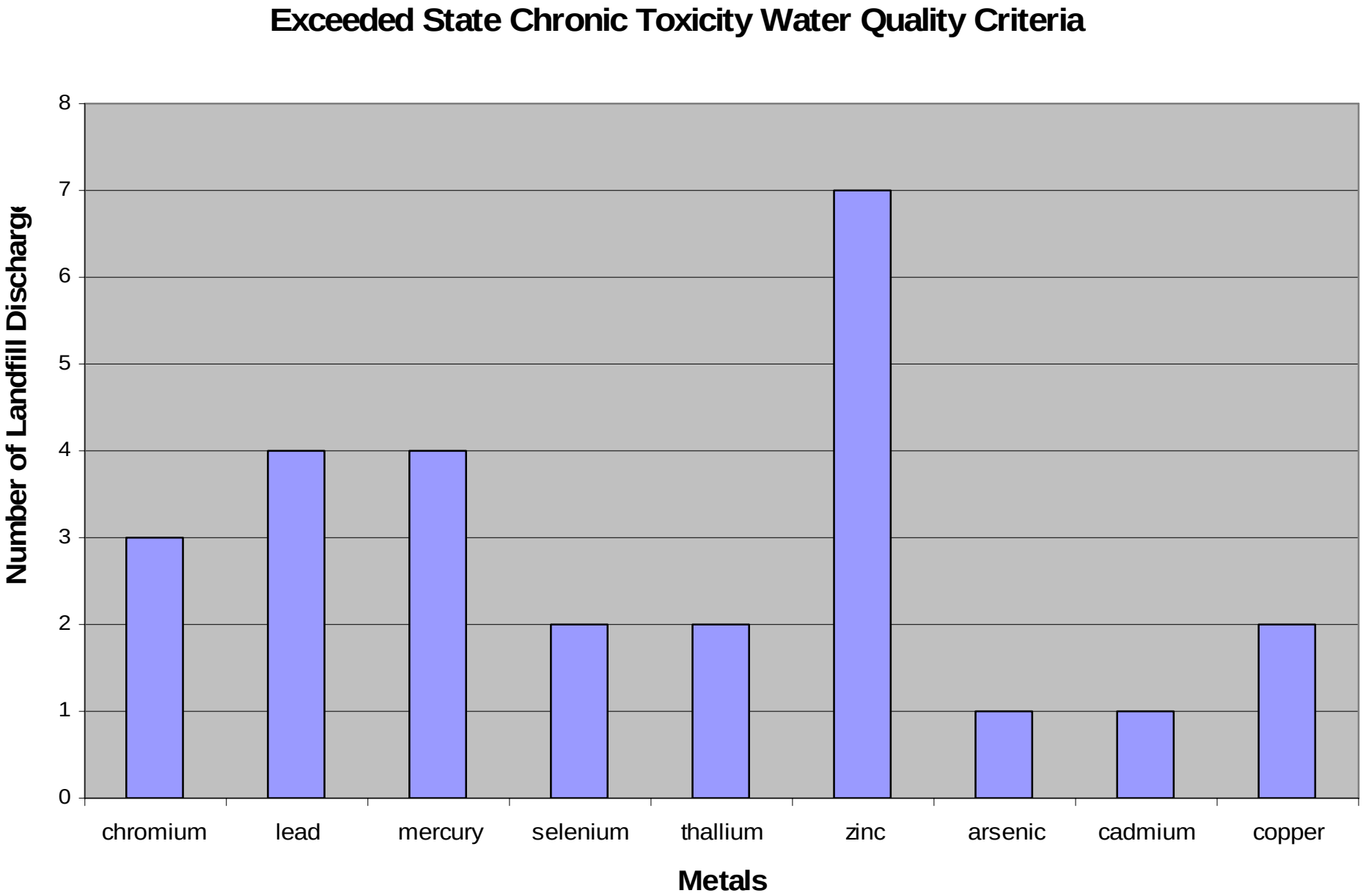
Project Scope

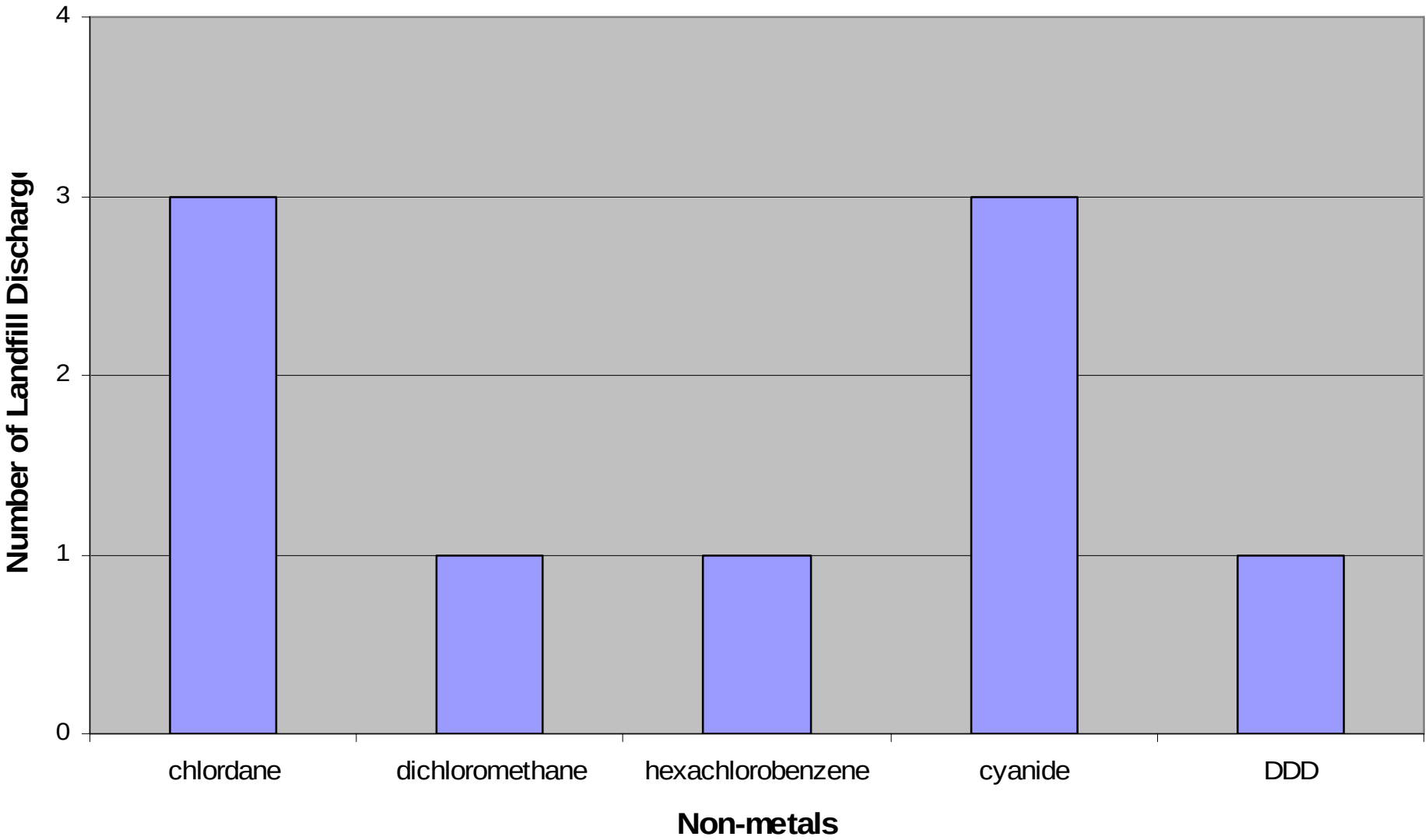
- Background
- Tasking
  - Investigate all inactive SW landfills on post
  - Characterize any leachate seeps
  - Determine impact of this leachate on the adjacent surface waters


Welch's Branch
McCoy's Creek
Cow Branch

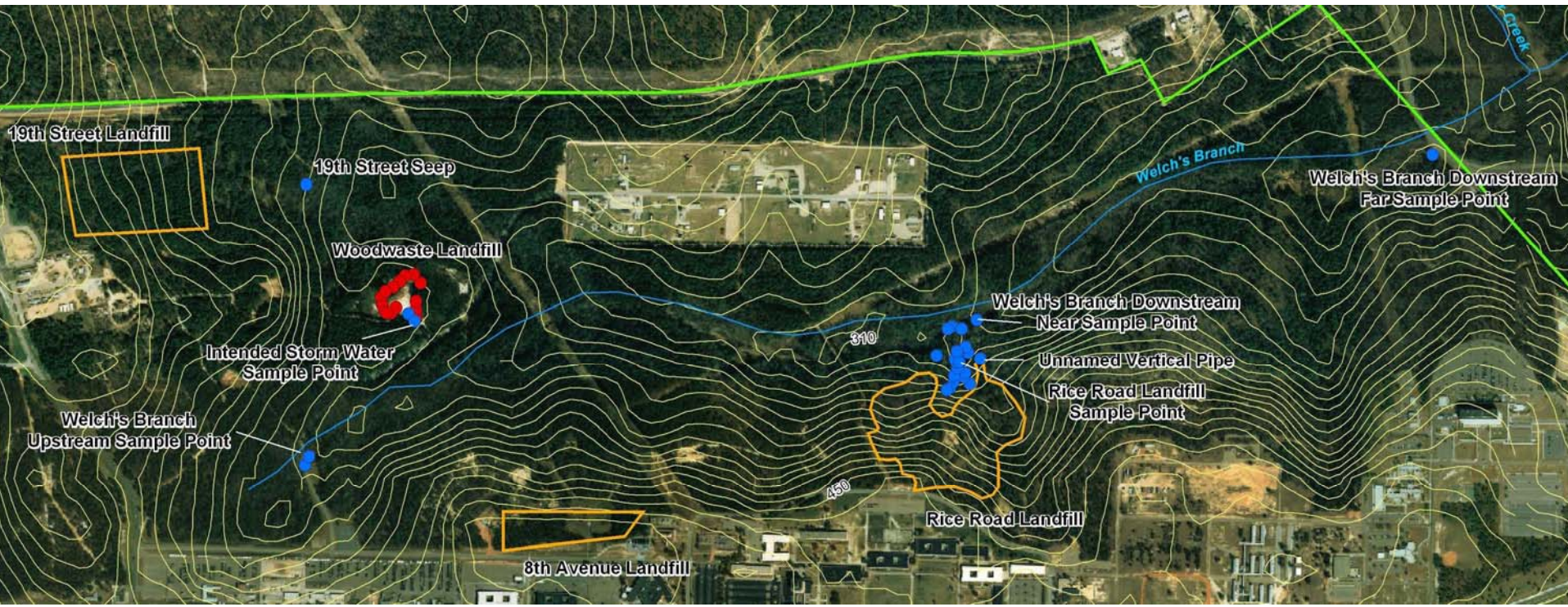
Evaluation of Landfill Discharges

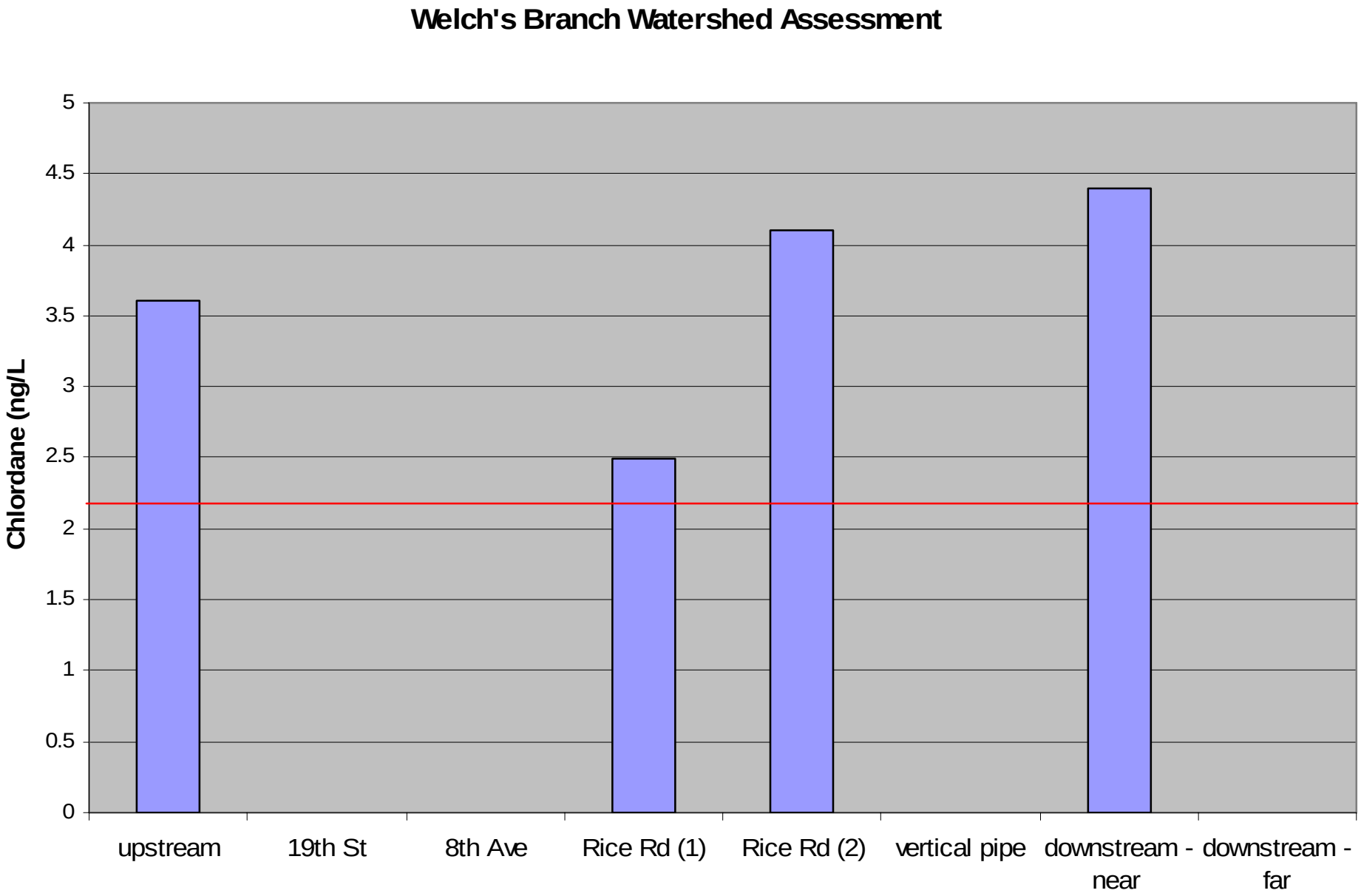
- Data
  - Installation records
  - Grab samples
- Compliance benchmarks
  - State water quality criteria
  - Maximum contaminant levels
  - State contaminant concentrations for uppermost aquifer beneath landfills

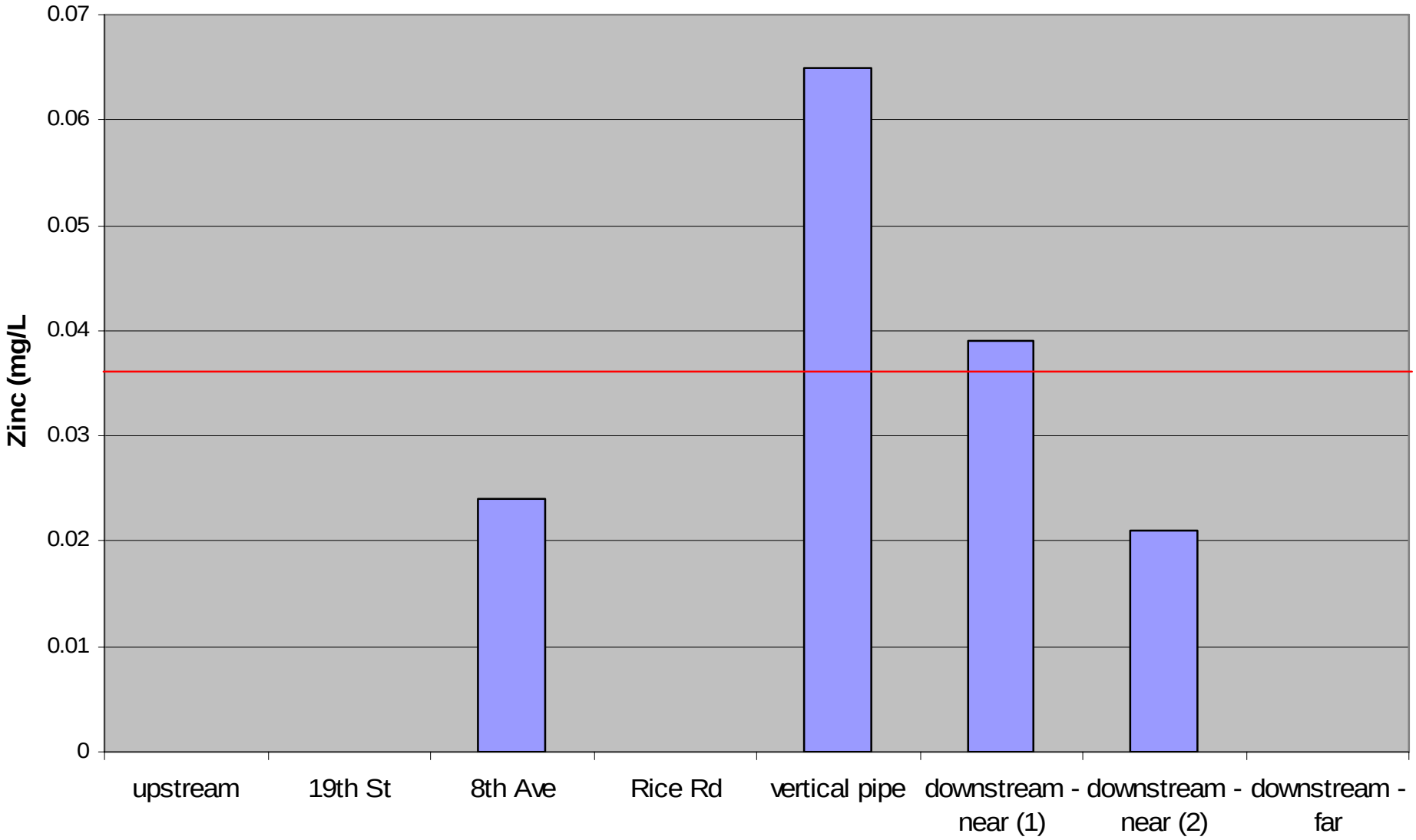

Exceeded State Chronic Toxicity Water Quality Criteria
Number of Landfill Discharg
8
7
6
5
4
3
2
1
0
chromium
lead
mercury
selenium
thallium
zinc
arsenic
cadmium
copper
Metals


Exceeded State Chronic Toxicity Water Quality Criteria
Number of Landfill Discharg
4
3
2
1
0
chlordane
dichloromethane
hexachlorobenzene
cyanide
DDD
Non-metals

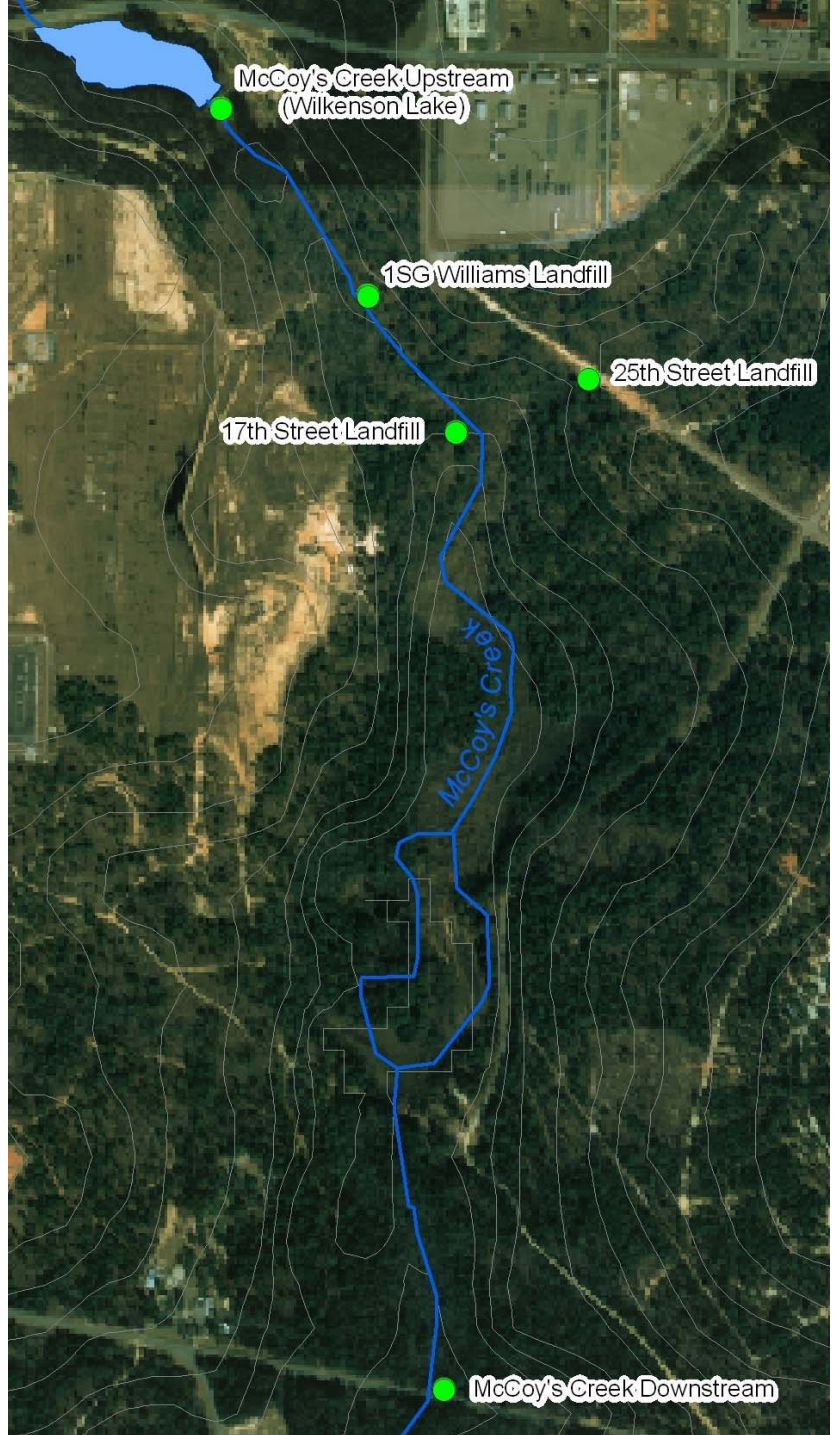
Welch’s Branch

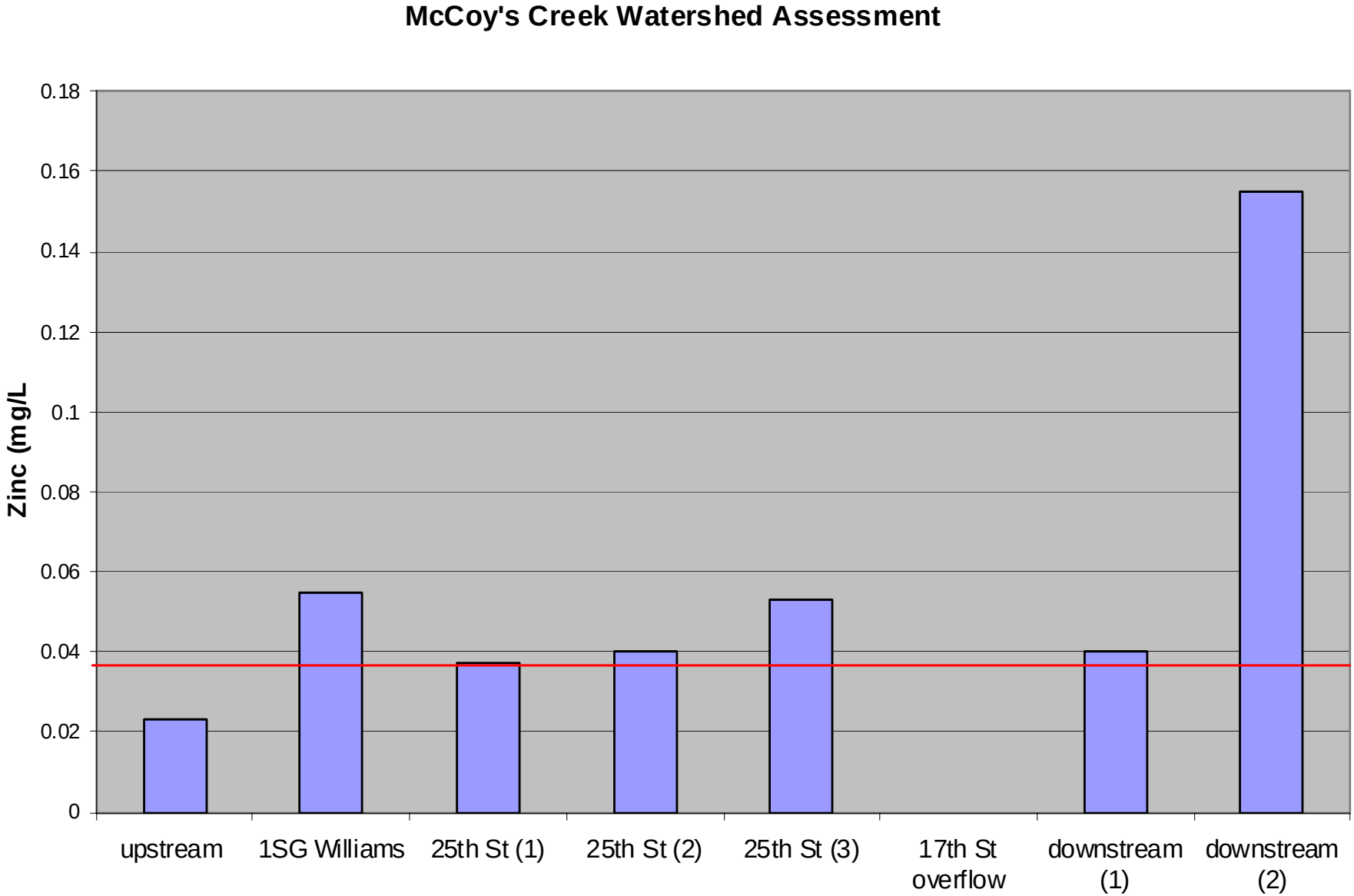



Welch's Branch Watershed Assessment
Chlordane (ng/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
upstream
19th St
8th Ave
Rice Rd (1)
Rice Rd (2)
vertical pipe
downstream - near
downstream - far

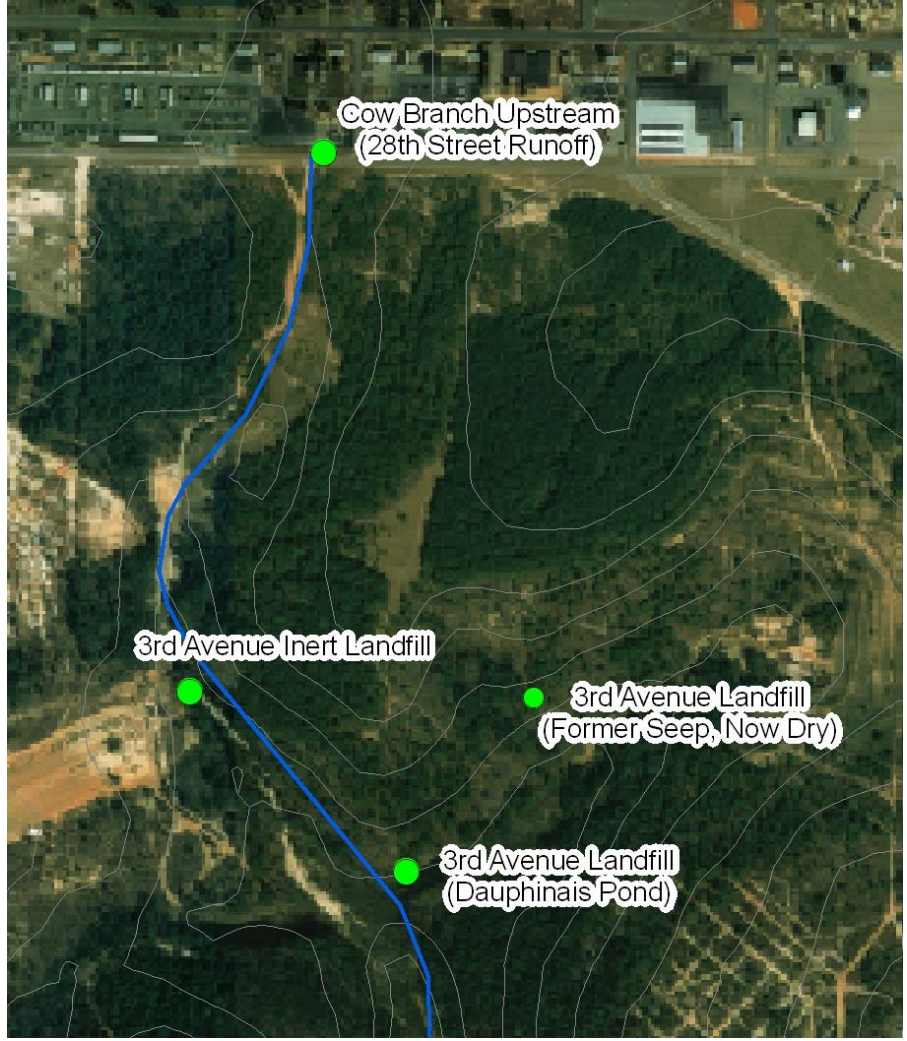

Welch's Branch Watershed Assessment
Zinc (mg/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
upstream
19th St
8th Ave
Rice Rd
vertical pipe
downstream - near (1)
downstream - near (2)
downstream - far

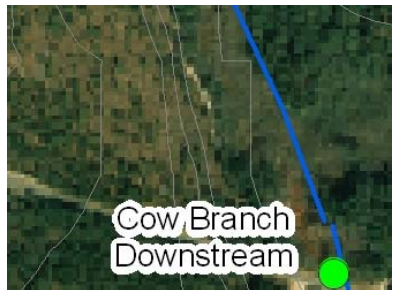
McCoy’s Creek

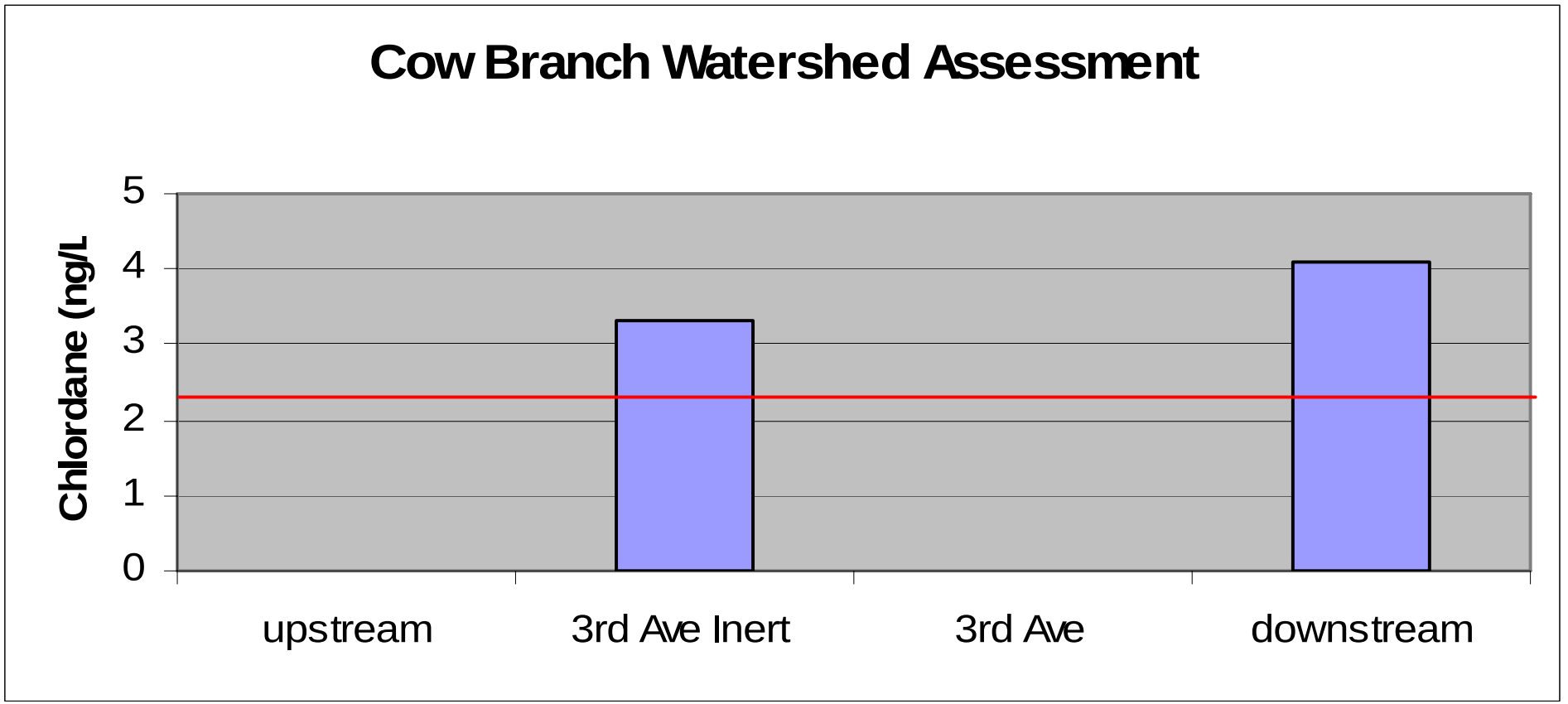



McCoy's Creek Watershed Assessment
Zinc (mg/L
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
upstream
1SG Williams
25th St (1)
25th St (2)
25th St (3)
17th St overflow
downstream (1)
downstream (2)

Cow Branch


Cow Branch Upstream
(28th Street Runoff)
3rd Avenue Inert Landfill
3rd Avenue Landfill
(Former Seep, Now Dry)
3rd Avenue Landfill
(Dauphinais Pond)


Cow Branch
Downstream


Cow Branch Watershed Assessment
Chlordane (ng/L
5
4
3
2
1
0
upstream
3rd Ave Inert
3rd Ave
downstream

Findings

- Two parameters identified downstream above benchmarks
- Chlordane
  - Construction and demotion debris identified as a source
  - Extremely low concentrations
- Zinc
  - 25th St Landfill is a source for McCoy's Creek

Conclusions

- Landfill leachate is susceptible to permitting under CWA
- If impacting surface water, discharge will be regulated
- Normal resolution
  - transport to STP
- Possible alternative
  - recap closed landfills

Questions?